

pulse signal inputting reached  $1 \times 10^{10}$  times in every case of driving at different driving frequencies, and their resistance values were substantially unchanged.

#### EXAMPLE 39

A heat-generating resistance layer with the same thickness was deposited in the same manner as in Example 38 except for changing the starting gases to  $\text{CH}_4/\text{Ar}=0.5$  (volume ratio),  $\text{SiF}_4/\text{Ar}=0.1$  (volume ratio) and  $\text{GeH}_4/\text{Ar}=0.05$  (volume ratio).

Next, when heat-generating resistance elements were prepared and electrical pulse signal was inputted therein in the same manner as in Example 38, the heat-generating resistance elements were not destroyed even when the number of electrical pulse signal inputting reached  $1 \times 10^{10}$  times. Also, no change in resistance value was recognized.

#### EXAMPLE 40

A heat-generating resistance layer with the same thickness was deposited in the same manner as in Example 38 except for maintaining  $\text{SiF}_4/\text{Ar}$  gas flow rate and  $\text{GeF}_4/\text{Ar}$  gas flow rate constant and changing continuously the discharging power.

When the thus obtained heat-generating resistance elements were driven in the same manner as in Example 38, it was confirmed that they had satisfactory durability similarly as in Example 38.

#### EXAMPLE 41

A heat-generating resistance layer with the same thickness was deposited in the same manner as in Example 39 except for maintaining  $\text{SiF}_4/\text{Ar}$  gas flow rate and  $\text{GeH}_4/\text{Ar}$  gas flow rate constant and changing continuously the discharging power.

When the thus obtained heat-generating resistance elements were driven in the same manner as in Example 39, it was confirmed that they had satisfactory durability similarly as in Example 39.

TABLE 10

Example No.	Starting material	Gas flow rate (SCCM)	Discharging power ( $\text{W}/\text{cm}^2$ )	Substrate temperature ( $^{\circ}\text{C}$ .)	Film thickness ( $\text{\AA}$ )
38	$\text{CH}_4/\text{Ar} = 0.5$	50	0.8	350	3000
	$\text{SiH}_4/\text{Ar} = 0.1$	5 $\rightarrow$ 2			
	$\text{GeF}_4/\text{Ar} = 0.05$	5 $\rightarrow$ 2			
	$\text{CH}_4/\text{Ar} = 0.5$	50	0.8	350	3000
39	$\text{SiF}_4/\text{Ar} = 0.1$	5 $\rightarrow$ 2			
	$\text{GeH}_4/\text{Ar} = 0.05$	5 $\rightarrow$ 2			
	$\text{CH}_4/\text{Ar} = 0.5$	50	0.8 $\rightarrow$ 0.9	350	3000
	$\text{SiH}_4/\text{Ar} = 0.1$	5			
40	$\text{GeF}_4/\text{Ar} = 0.05$	5			
	$\text{CH}_4/\text{Ar} = 0.5$	50	0.8 $\rightarrow$ 0.9	350	3000
	$\text{SiF}_4/\text{Ar} = 0.1$	5			
	$\text{GeH}_4/\text{Ar} = 0.05$	5			
41	$\text{CH}_4/\text{Ar} = 0.5$	50	0.8 $\rightarrow$ 0.9	350	3000
	$\text{SiF}_4/\text{Ar} = 0.1$	5			
	$\text{GeH}_4/\text{Ar} = 0.05$	5			
	$\text{CH}_4/\text{Ar} = 0.5$	50	0.8 $\rightarrow$ 0.9	350	3000

We claim:

1. A heat-generating resistor, having a functional thin film comprising an amorphous material containing halo-

gen atoms and hydrogen atoms in a matrix of carbon atoms formed on a substrate, wherein said halogen atoms and/or hydrogen atoms are distributed nonuniformly in the film thickness direction in said functional thin film.

2. A heat-generating resistor according to claim 1, wherein said functional thin film further contains silicon atoms distributed nonuniformly in the film thickness direction in said functional thin film.

3. A heat-generating resistor according to claim 1, wherein said functional thin film further contains germanium atoms distributed nonuniformly in the film thickness direction in said functional thin film.

4. A heat-generating resistor according to claim 1, wherein said functional thin film further contains silicon atoms and germanium atoms distributed nonuniformly in the film thickness direction in said functional thin film.

5. A heat-generating resistor according to claim 1, wherein said functional thin film further contains a substance for controlling electroconductivity distributed nonuniformly in the film thickness direction in said functional thin film.

6. A heat-generating resistor according to claim 2, wherein said functional thin film further contains a substance for controlling electroconductivity distributed nonuniformly in the film thickness direction in said functional thin film.

7. A heat-generating resistor according to claim 3, wherein said functional thin film further contains a substance for controlling electroconductivity distributed nonuniformly in the film thickness direction in said functional thin film.

8. A heat-generating resistor according to claim 4, wherein said functional thin film further contains a substance for controlling electroconductivity distributed nonuniformly in the film thickness direction in said functional thin film.

9. A heat-generating resistor according to any one of claims 1, 2, 3, 4 and 5, wherein the content of halogen atoms in said functional thin film is 0.0001 to 30 atomic %.

10. A heat-generating resistor according to any one of claims 1, 2, 3, 4 and 5, wherein the content of hydrogen atoms in said functional thin film is 0.0001 to 30 atomic %.

11. A heat-generating resistor according to any one of claims 1 and 5, wherein the sum of the content of halogen atoms and the content of hydrogen atoms in said functional thin film is 0.0001 to 40 atomic %.

12. A heat-generating resistor according to claim 2, wherein the sum of the content of silicon atoms, the content of halogen atoms and the content of hydrogen atoms in said functional thin film is 0.0001 to 40 atomic %.

13. A heat-generating resistor according to claim 3, wherein the sum of the content of germanium atoms, the content of halogen atoms and the content of hydrogen atoms in said functional thin film is 0.0001 to 40 atomic %.

14. A heat-generating resistor according to claim 4, wherein the sum of the content of silicon atoms, the content of germanium atoms, the content of halogen atoms and the content of hydrogen atoms in said functional thin film is 0.0001 to 40 atomic %.

15. A heat-generating resistor according to any one of claims 1, 2, 3, 4 and 5, wherein halogen atoms are F or Cl.